

Predatory Impacts on Stocked Chinook Salmon Smolts in the Milwaukee Harbor – 2000

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The Lower Milwaukee River has been stocked with walleye fingerlings annually since 1995 as part of a walleye restoration effort. In order to reduce the predation impact of walleye on stocked chinook salmon smolts, the stocking location of chinook salmon was relocated to McKinley Marina from immediately below the former North Ave. Dam (Hirethota and Coffaro 1998). Furthermore, the Milwaukee Area Great Lakes Sports Fisherman Club provided net pens to hold smolts for two nights in the Marina water for better acclimatization before they were released.

Chinook salmon smolt stocking

In 2000, 143,900 chinook salmon smolts from DNR hatchery system were distributed into two net pens held in the Marina at the UW-Milwaukee Sailing Center on the afternoon of May 8, 2000. The LMWU staff tended the nets on the following two days and removed smolts which died due to stress. Following holding for two nights, the LMWU staff attempted to release the smolts around 3:30pm on May 10, 2000. When we noticed several hundred birds (common terns, mainly) trying to capture the smolts, we closed the net pens and decided to release the fish later in the evening. We returned to the net pens later in the evening and released all the smolts. Earlier in the evening, one of the club members also had attempted to unzip the pens to facilitate release of smolts. At this time of the day the bird impact was minimal.

Predator sampling

As part of our continued monitoring effort to assess predatory impact on these stocked chinook salmon smolts following stocking, we electroshocked the immediate vicinity on the night of May 11, 2000. Our goal was to cover the area including the Summerfest lagoon (inside and outside), shoreline along Veteran's Park and McKinley Marina in one night. Due to severe weather conditions, the crew had to quit after sampling the Summerfest lagoon area. We did capture a lot of fish in this area and processing took a significant amount of time. We attempted to sample the following night, but could not get on the water, again due to severe weather conditions. However, we were able to complete the sampling effort on Monday, May 15, 2000. The area covered and the time spent (shocking effort) to capture predatory species was as follows: Summerfest lagoon (outside – 35 min.; inside – 49 min.); Pieces of Eight and Art Museum breakwall (13 min.); shoreline along Veterans' Park (15 min.); McKinley Marina slips (123 min.); and McKinley Marina pier and breakwall (32 min.). The entire area was covered very thoroughly and all the predatory fish were captured to collect stomach contents.

Results

Table 1 summarizes the distribution of predatory fish species in different areas and the number of stomach samples that we were able to obtain during two nights of shocking effort. The majority of the fish were captured inside the Summerfest lagoon.

Table 1. Summary of number of fish captured by location and stomach samples collected in the Milwaukee Harbor, May 2000.

Boom shocking location	Species captured	# captured	# stomach samples	# fish not sampled
Summerfest lagoon – outside	Walleye	2	2	0
	Smallmouth bass	3	3	0
Summerfest lagoon – inside	Walleye	3	3	0
	Smallmouth bass	31	30	1
	Largemouth bass	17	17	0
	Brown trout	7	7	0
	Northern pike	1	1	0
Art Museum	Smallmouth bass	1	1	0
Veterans' Park	None			
McKinley Marina – slips	Largemouth bass	5	5	0
	Brown trout	2	1	1
	Northern pike	2	2	0
McKinley Marina – pier and breakwall	Smallmouth bass	1	1	0
	Brown trout	1	1	0

The predatory fish captured for this study included walleye, smallmouth bass, largemouth bass, brown trout and northern pike. Smallmouth bass dominated the overall catch, accounting for more half of the total fish caught in the Summerfest lagoon. Only five walleye were found in two nights of electroshocking effort (Table 1). There were very few predatory fish in the McKinley Marina area where the chinook salmon smolts were stocked. However, alewife and gizzard shad were abundant in the entire area.

In the entire sample of 76 stomachs only one identifiable salmonid (brown trout) was found in the stomach of a largemouth bass (Table 2-3). The items which are categorized as 'unidentified fish parts' included vertebral columns, fins, skin and other bony parts. These items did not have any resemblance to a salmonid smolt body. One spottail shiner was found in the stomach of a northern pike.

The number of prey items varied from fish to fish and did not appear to be a function of the size of the fish. Also, there were many stomachs which did not contain any identifiable food item. Only five walleye were captured in the entire effort, and there was none in the McKinley Marina (Table 1). Of the five walleyes sampled, two had

empty stomachs, one had alewife and the other two had fish vertebral columns present (Table 2).

A close look at the stomach contents of these predatory fish in the area sampled indicate that alewife forms the dominant food item followed by 9-spine stickleback (Table 4). The stickleback that were in identifiable condition appeared to be 9-spine stickleback.

Conclusion

The study indicated that the predatory species in the vicinity of chinook salmon smolt stocking were comprised of smallmouth bass, largemouth bass, brown trout, walleye and northern pike, in order of abundance. Smallmouth bass was the most abundant species, especially in the Summerfest lagoon area. There were very few predatory fish in the McKinley Marina where the chinook salmon smolts were planted. No walleye were captured from this area. We did not come across any smolts during the survey, implying that the smolts were dispersed very well. The area was abundantly supplied with alewife and gizzard shad. Alewife was the most common food item found in all the predatory species followed by 9-spine stickleback. Other miscellaneous food items present were amphipod, crayfish and insects. None of the fish sampled had chinook salmon smolts in their stomachs. From the study, it appears that the predation impact on the stocked chinook smolt in their immediate vicinity of stocking in the Milwaukee Harbor is negligible.

Reference

Hirethota, P. S. and Coffaro, M. 1998. Analysis of stomach content and population estimation of walleye in the lower Milwaukee River and Harbor.

Table 2. Stomach content of various predatory species captured on 5/11/00 in Summerfest Lagoon and the vicinity following stocking of chinook salmon smolts.

FISH #	SMALLMOUTH BASS	LARGEMOUTH BASS	BROWN TROUT	WALLEYE	NORTHERN PIKE
1				1 fish vertebral column	
2				2 alewife	
3	1 semidigested fish (stickleback)				
4	2 stickleback				
5	12 amphipods, 1 fish vertebral column (stickleback)				
6			empty		
7			7 semidigested alewife		
8			empty		
9			3 fish vertebral column (stickleback)		
10			9 semidigested alewife		
11	empty				
12	empty				
13	2 fish vertebral column; 1 semidigested alewife				
14	2 semidigested fish				
15				2 fish vertebral column	
16	1 fish vertebral column; 1 semidigested fish				
18	1 semidigested alewife; 2 semidigested stickleback				
19	1 fish vertebral column; 1 semidigested fish				
20	1 semidigested alewife; 2 fish vertebral column				
21			2 semidigested alewife; 1 freshly eaten alewife		
22		empty			
23		3 semidigested alewife			
24	empty				
25		1 alewife; parts of crayfish			
26		1 semidigested fish			
27		1 semidigested salmonid (brown trout)			
28				empty	
29		empty			
30	3 semidigested fish				
31		1 semidigested alewife			
32				empty	
33		2 semidigested stickleback			

(Table 2 Continued)

FISH #	SMALLMOUTH BASS	LARGEMOUTH BASS	BROWN TROUT	WALLEYE	NORTHERN PIKE
34	3 fish vertebral column; 2 semidigested fish (stickleback)				

35	empty				
36	1 insect larva				
37	3 partially digested fish				
38	3 semidigested alewife				
39	empty				
40		1 alewife			
41			1 semidigested fish		
42					1 spottail shiner; 1 semidigested fish
43	2 semidigested fish				
44	2 small pieces of insects				
45	1 alewife; 1 amphipod; 1 unidentified insect				
46		1 semidigested fish (stickleback)			
47	1 fish vertebral column; 1 semidigested fish				
48	empty				
49	2 semidigested alewife				
50	1 semidigested alewife				
51	1 alewife; 1 amphipod				
52		2 semidigested fish; 1 freshly eaten alewife			
53	1 fish vertebral column; 1 insect larva				
54	2 amphipods				
55	empty				
56		empty			
57		1 fish vertebral column			
58		1 fish vertebral column			
59	2 fish vertebral column; 3 amphipods				
60	1 semidigested fish				
61		1 alewife			
62		1 alewife			
63		2 9-spine stickleback			
64	4 semidigested fish				

Table 3. Stomach content of different predatory fish species captured on 5/15/00 in McKinley Marina and the vicinity following chinook salmon smolt stocking.

FISH #	SMALLMOUTH BASS	LARGEMOUTH BASS	BROWN TROUT	WALLEYE	NORTHERN PIKE
1	2 fish vertebral column				
2			6 freshly eaten alewife; 5 semidigested alewife;		
			10 9-spine stickleback and 1 stickleback vertebral column		
3			empty		
4		1 semidigested fish			
5		empty			
6		parts of 2 crayfish			
7		3 semidigested alewife			
8		empty			
9					empty
10					1 semidigested alewife
11	1 semidigested stickleback				
12			6 9-spine stickleback		

Table 4. Diet by food item for various predatory species captured in Milwaukee Harbor (5/11/00 and 5/15/00)

Food item	Predatory species sampled				
	SMALLMOUTH BASS (36)	LARGEMOUTH BASS (22)	BROWN TROUT (10)	WALLEYE (5)	NORTHERN PIKE (3)
Alewife	5	6	4	1	1
Spottail shiner	0	0	0	0	1
Salmonid smolt	0	1	0	0	0
9-spine Stickleback	5	3	3	0	0
Unidentified fish parts	15	5	1	2	0
Amphipod	5	0	0	0	0
Insect parts	4	0	0	0	0
Crayfish	0	2	0	0	0
Empty stomachs	7	5	3	2	1

Numbers in parentheses refer to the total number of fish sampled for each species